APPENDIX I

Summary of Disposal Practices

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Summary of Facility Waste Streams and Disposal Practices

Site History Report – October 2004

Former Ingersoll Rand Company Facility

Phillipsburg, New Jersey

I.1 General Division Waste Management

The maintenance department of the General Division was responsible for the collection, treatment, and disposal of wastes (hazardous and non-hazardous) for the Ingersoll Rand facility. Based on the information available, a comprehensive summary of practices since the beginning of plant operations was not possible. However, facility records indicate that the old landfill (AOC-29) was the sole location for disposal of plant waste materials for approximately 60 years.

Foundry sand, which represents approximately 75% of the waste material, was transported from the Foundry Division in the northwest corner of the site to the old landfill by the on-site railroad and was unloaded with a mobile crane and bucket. Other wastes deposited in the old landfill include cafeteria wastes, office waste, and other industrial wastes including spent solvents and oils. Based on historical documentation, incinerators may have been used to burn combustible materials prior to placement in the landfill to reduce their volume.

After 1974, most of the facility's wastes were disposed off-site. After 1977, spent foundry sand was also disposed off site. Construction debris (dirt and concrete), bulky materials (wood patterns and rotor racks), and dust from the plant's dust collectors continued to be disposed in the old landfill until 1981. In 1990, a new Class II permitted landfill was opened at the site to accept foundry sand and construction debris. Details of these disposal practices are included in the following subsections.

I.1.1 Bulk Liquid Waste Management

It is unclear how bulk liquid wastes were handled (if present) prior to the 1980s. While it is known that spent solvents and oils were placed in the old landfill, applied to land for dust and weed control, and combusted in the facility's Power House, times and durations of these practices were not documented.

After 1980, according to a 1981 *RCRA Inspection Report*, bulk liquid wastes treated onsite included waste oils and spent solvents produced by the various divisions. An ultrafilter (AOC-28) on the west side of the Powerhouse Boiler Room, a 2,000 gallon process AST (AOC-24), and a 5000 gallon waste AST (AOC-20) were used to separate used oils and solvents from wastewater and containerize them for subsequent disposal. The water was discharged to the sanitary sewer under a SIU permit. The 5,000 gallon UST was emptied by disposal/recycling contractors. Used filters from the Ultrafilter were returned to the manufacturer for processing. Waste oil was also collected and removed from the following locations:

TABLE I-1: Wastes Reportedly Removed from Site via Vacuum Truck (1985)

Location	Source Tank	Tank Contents
Powerhouse, east end	2000 gallon AST (1994 ACO AOC 19)	Condensate from air compressor after-coolers and chiller dryer.
Powerhouse, west end	5000 gallon AST in Powerhouse basement, (1994 ACO AOC 20)	Waste oils and solvents from Ultrafilter.
Turbo Division, #9 Shop south end	2000 gallon AST (1994 ACO AOC 21)	Contents of sumps for metal-working machinery.
Cameron Chip Pad	2000 gallon UST (1994 ACO AOC 26)	Contents of sumps for metal-working machinery.
Spray Pond Oil Skimmer	600 gallon AST (1994 ACO AOC 22 "Brill Skimmer")	Oil skimmed from storm water entering the Spray Pond. Mainly water/oil from the #8 Shop Test Area

Source: January 25, 1985 letter from Samuel S. Bodder to Bruce Ferretti (Manager of Facilities Engineering) re: Ultrafilter

I.1.2 Hazardous Waste Storage and Shipment

Since at least the mid-1980s hazardous waste has been stored in one of two hazardous waste storage sheds. One still operating storage area, located east of the Powerhouse had previously been identified as AOC-27; another was located south of Building #9 and is no longer used. Based on the design of storage shed east of Building #12, the sheds are constructed in a diked area with a concrete floor and an internal collection sump. The currently operating shed is inspected weekly in accordance with RCRA and DPCC regulations. All hazardous wastes are disposed at permitted off-site disposal facilities under manifest.

I.1.3 Incineration

Facility documents indicated that five incinerators were located on the IR site over the course of its operations (see Appendix M for details regarding their locations).

According to a 1985 RCRA questionnaire, a solid waste incinerator was built south of the Spray Pond (AOC-23) in 1967 and was closed in 1974 due to continuing operational problems. The Solid Waste Incinerator's certificate expired on July 27, 1975, and no effort was made to renew. Alternative offsite disposal was arranged via sub-contractors by May 1974.

Documents indicate that combustible liquid wastes were incinerated on-site for some period of time. Documentation from 1981 shows this incineration likely took place in the plant boiler. By 1985, facility records indicated that the boiler would no longer be used to incinerate non-halogenated solvents in order to meet RCRA permit requirements.

I.1.4 Old Landfill (AOC-29)

As discussed above the old landfill was the only location for disposal of plant waste materials for approximately 60 years. The landfill received spent foundry sand and facility waste from approximately 1903 until 1977. Additional details regarding the landfill are discussed in Appendix K.

I.1.5 Other Disposal Methods and Areas

According to a document from 1953, trash was placed in an area (15 feet by 35 feet) near scrap metal bins located east of Building #13 (Map #MD1960, 1953). It is not known what type of material was placed here

Other waste disposal methods were discussed in a type-written interview that had been conducted in 1981 with a retired IR maintenance employee. According to this interview, waste oils, waste solvents, and cutting fluids were distributed over the roads as dust control agents. Waste oils and solvents were placed around transformers and fences as a form of weed control.

An internal status report from 1981 titled "Material from Inverse Pond Cleanout" mentioned that the lower ponds were dredged, and the oily sludge obtained was deposited in a hole north of one of the ponds (AOC-2).

I.1.6 Offsite Disposal After the Old Landfill Closure

Purchase orders indicate that High Point Sanitation removed wastes from the site in 1974 and 1975. These purchase orders support other documents that indicate wastes were taken offsite for disposal in this timeframe. By 1981, all remaining on-site disposal was stopped, according to a memo from the Facility Manager to the Division Manager, and all non-hazardous waste was to be placed in a dumpster.

The 1983 industrial waste survey indicates that inorganic and organic liquids, as well as industrial wastes, were taken offsite for disposal.

I.2 Cameron Division Waste Management

According to the 1981 *RCRA Inspection Report*, the main wastes produced by the Cameron Division were: scrap metal, coolant and cutting oils, waste solvents, test tank contents, and excess hazardous raw materials. The General Division managed solvent wastes, which have been described in Section I.1. A summary of the known waste handling procedures for Cameron Division's other wastes is presented below:

I.2.1 Scrap Metal Disposal

Though pieces of iron, steel, and stainless steel themselves would not be deemed hazardous, chips and cuttings may have been lightly coated with cutting oil. In general scrap metal was segregated by metal type and recycled by the Foundry Division. Another source from 1981 indicates that metal chips were placed in High Point Sanitation containers, which were probably removed off-site.

I.2.2 Coolant and Cutting Oil Disposal (Not Handled by General Division)

Prior to the 1940s it is unclear which substances were used as metalworking fluid. After the 1940s, the Cameron Division reportedly used a water soluble oil, manufactured by Cimcool, to lubricate and cool its metal working machines. After use, Cimcool was filtered and recycled until the substance broke down. Spent Cimcool was stored in an UST prior to offsite disposal at an incinerator. Sludge and spent filters from the recycling process were disposed in the facility landfill. Previous employee interviews indicated that spent coolant was also applied to land surface for disposal. As indicated in Appendix E, the Cameron Coolant Disposal area was identified as AOC-6 and its location has never been positively identified.

I.2.3 Solvent Disposal

According to the 1981 RCRA Inspection Report, spent solvents were being stored in unmarked drums in the Cameron area. No specific disposal information was provided. It is likely that the drums were removed by maintenance for disposal. Disposal operations through site history may have included placement in landfill, land application for dust and weed control, incineration in the onsite boiler, and offsite disposal.

I.2.4 Test Tank (Test Pits) Content Disposal

The Cameron Division had large water tanks for its pump testing operations. No information was available concerning where this water and sludge from these structures may have been disposed. Possible disposal practices would have included draining the tanks into the storm or sanitary sewers, or pumping the water to the Spray Pond or other onsite ponds. Based on previous site practices sludge was likely disposed at the old landfill.

I.2.5 Potentially Hazardous Raw Material Disposal

There were several raw materials used by Cameron that were listed in the 1981 Capsule RCRA Inspection Report as hazardous if disposed. These included: gray enamel, red oxide, naval jelly, lacquer thinner, Cimcool, and xylene. A variety of oils, lubricants, epoxy, solvent, rust inhibitor, and degreasers were also listed as potentially hazardous. No information regarding the disposal process for unused hazardous materials was provided.

TABLE I-2: Cameron Division: Summary of Waste Disposal* (1981)

Waste Product	Disposal Method
Spent Cooling Oil and Coolant	UST, Certified Treatment Facility
Grinding Sludge	High Point Containers, Landfill**
Oil and Coolant Filters	Burned in old stress relief oven or highpoint containers
Contaminated Metal Chips	High Point Containers, Reclamation, Landfill**
Dust from Shot Blast Collector	Landfill**
Dry-Type Paint Booth Filters	High Point Containers
Spent Solvents	Powerhouse***, Certified Treatment Facility (via General Division)
Test Tank Contents	Unknown

Source: August 25, 1981. Craig Kauffman. Note to RCRA File (attached to Hazardous Waste Management Memos); Capsule Laboratories 1981 *RCRA Inspection Report.*

* It should be noted that this table is based on IR management documents, and that interviews with former employees have revealed that other disposal practices were also employed. Please refer to Section I.1.

** It is unclear whether the landfill indicated in these documents was the onsite landfill or another offsite disposal facility.

*** It is not clear whether this indicates that the spent solvent were being incinerated at the Power House, or stored at the adjacent Hazardous Materials Storage Shed for offsite disposal.

I.3 Drill Division (Including Heat Treating and Plating Operations) Waste Management

According to the 1981 *RCRA Inspection Report*, the Drill Division produces various waste materials including scrap metals, spent cutting oils and lubricants, spent quench oil and water quench solutions, spent salt baths. degreasing solutions, paint booth wastes, Parkerizing solutions, and various hazardous raw materials.

I.3.1 Scrap Metal Disposal

During early operations, cuttings and chips were likely recycled or disposed of in the facility landfill. Later, according to the 1981 *RCRA Inspection Report*, cuttings and chips from Drill Division operations were collected, compacted, and sold to an offsite recycling facility.

I.3.2 Cutting Oil and Coolant Disposal

As in the Cameron Division, the Drill Division used coolant and cutting oil in its metal working processes. According to the 1981 *RCRA Inspection Report*, waste coolant and cutting oil were processed by the ultrafilter and disposed at a certified treatment facility. As previously indicated, spent metal working fluids were possibly disposed of in the old landfill or spread to suppress dust and/or weeds during earlier site operations.

I.3.3 Quench Oil Solution Disposal

Waste oil was generated by the parts-quenching baths utilizing hot oil in the Drill Division. Quench oil was stored in two 10,000-gallon tanks (AOC-12) and, based on the 1981 *RCRA Inspection Report*, spent quench oil was removed and disposed offsite. Sludge from the quench tanks was disposed in the landfill. Prior to this disposal practice, it is unclear how quench oils were disposed. However, as previously indicated, disposal practices may have included placement in the old landfill, land application, onsite incinerations, and offsite disposal.

I.3.4 Salt Bath Waste Disposal

Two types of wastes were associated with the sodium nitrate salt bath used by the heat-treating process. Waste salt solution was discharged into a settling pond governed by an NPDES permit (likely the Inverse Ponds). The document consulted did not contain information on the discharge location for rinse water used to clean heat-treat salt pots (Capsule Laboratories, 1981).

Other documentation indicates that between 1964 and 1978 metal parts were placed in open pots of molten cyanide salt as the primary method to harden machine parts. The waste generated from cleaning out the cyanide salt solutions was deposited in the on-site landfill, as were entire salt pots when they broke or started leaking. The cyanide salt pot waste was placed in the on-site landfill from 1964 until IR contracted High Point Sanitation, after which time the waste was transported off-site. The exact date of the contract is not known because of discrepancies in documentation, but evidence indicates that it was sometime between 1974 and 1977.

I.3.5 Water Quench Solution Waste Disposal

In the Drill Division water-polyalkylene baths were also used to quench parts. Waste solution and sludge were generated during this process; however, no documentation of disposal of these materials was identified (Capsule Laboratories, 1981). It is anticipated that disposal practices for these solutions was release to the sanitary sewer system,

I.3.6 Degreasing Solution Disposal

The Drill Division produced waste solvent and caustic wastes via parts degreasing operations. No documentation of disposal of these materials was identified in the 1981 RCRA Inspection Report; however, as previously indicated, disposal practices may have included placement in the landfill, land application, onsite incineration, and offsite disposal.

I.3.7 Paint Booth Scrubber Water Disposal

A least two painting systems existed in the Drill Division. The first system was installed in 1968, and was reportedly cleaned out once a year. The wastes – likely dried paints – were reportedly disposed of in the Old Landfill (AOC-29) until High Point Sanitation started to transport the wastes off-site (sometimes between 1974 and 1977). Liquid wastes, generated by a wet scrubber were diverted to a waste oil tank. No disposal information was provided, however, possible disposal practices may have included placement in the old landfill, discharge to the sanitary or stormwater system, or offsite disposal.

A new paint system was installed in 1980, and had not been cleaned out as of the date of the document (1982). ENSR did not find documents that reveal the fate of these later wastes. However, given the timeframe it is likely that these wastes were disposed of off-site.

Earlier painting operations are anticipated to have been uncontrolled.

I.3.8 Parkerizing Waste Disposal

The Drill Division used parkerizing in its metal treating operations. The Parkerizing technique is a phosphate etching process that produces a hard matte or dull finish that is very durable. This process used parkerizing solution (acid phosphate), oil spray, and rinse water. Waste parkerizing solution, oil, and rinse water were discharged into the onsite settling pond (Capsule Laboratories, 1981).

I.3.9 Metals Plating Waste Disposal

It is known from a review of site drawings that cadmium, chromium, copper, nickel, and possibly other metal plating was conducted at the facility. However, no documentation was found indicating the handling or disposition of the wastes derived from site metal plating operations.

I.3.10 Potentially Hazardous Raw Material Disposal

There were several raw materials used by the Drill Division that were listed by the 1981 Capsule RCRA Inspection Report as hazardous. These included a variety of thinners, enamels, primers, acids, coatings, xylene, perchloroethylene, methyl ethyl ketone, lead, methanol, and other materials whose use was not immediately identifiable. A variety of oils, lubricants, solutions, and other materials were also listed as potentially hazardous. No information on the disposal processes or locations was cited in the source (Capsule Laboratories, 1981).

Table I-3: Drill Division: Summary of Waste Disposal* (1964-1981)

Waste Product	Disposal Method
Spent Cooling Oil and Coolant	UST, Ultrafilter, Certified Treatment Facility
Grinding Sludge	Landfill**
Dust from Tool Room Collector	High Point Containers
Spent Solvents	Powerhouse***, Certified Treatment Facility
Heat Treat Quench Oil Sludge	High Point Containers
Heat Treat Salt Pot Sludge	Landfill (prior to 1964-1974/1977); High Point Containers (post 1974/1977)
Heat Treat Wash Solutions	Drain to Pond
Blow Out Tanks, Rinse Overflow	Drain to Pond
Parkerizing Rinse Overflow	Drain to Pond
Metals Plating Wastes	Unknown
Water Wash Paint Booth Sludge	Onsite Landfill (1968-1974/1977), Offsite (post 1974/1977)
Scrap Metal	Compacted, sent to reclaimer
Water Polyalkanene Quench Solution and Sludge	Unknown
Degreasing Solution	Unknown

Source: August 25, 1981. Craig Kauffman. Note to RCRA File (attached to Hazardous Waste Management Memos); January 8, 1982, Memo to Nicholas Cooney, Assistant Company Counsel to Craig Kauffman, Manager of Engineering, Facilities Department re: Disposal of Heat Treat and Painting Wastes.

* It should be noted that this table is based on IR management documents, and that interviews with former employees have revealed that other disposal practices were also employed. Please refer to section I.1.

** It is unclear whether the landfill indicated in these documents was the onsite landfill or another offsite disposal facility.

*** It is not clear whether this indicates that the spent solvent were being incinerated at the Power House, or stored at the adjacent Hazardous Materials Storage Shed for offsite disposal.

I.4 Turbo/Compressor Division Waste Management

The Turbo/Compressor Division's main processes – cutting, grinding, pickling, degreasing, painting, and sandblasting – produced a variety of wastes Including spent coolants and lubricants, sludge, spent degreaser, and sandblast wastes., Waste pickling solution and sludges are generally classified as hazardous wastes (Capsule Laboratories, 1981).

I.4.1 Cutting Oil and Coolant Disposal

The coolants and cutting oils used in the Turbo/Compressor Division were not identified in the documents ENSR reviewed, nor is it known how they were disposed. Both the Cameron and

Turbo/Compressor Divisions utilized similar processes and their waste disposal methods would likely have been similar.

I.4.2 Caustic Degreaser Waste Disposal

The Turbo/Compressor Division had a small degreaser, though the source consulted did not state its precise location or type of degreasing solution used. Based on the 1981 RCRA Inspection Report, used degreasing solution was stored in a waste oil tank and collected for offsite recycling or disposal. Prior disposal practices are anticipated to have included placement in the old landfill, land application, onsite incineration, and offsite disposal.

I.4.3 Pickling Waste Disposal

A pickling facility was located in the Turbo/Compressor Division, though the source consulted did not state its precise location. Based on Capsule's 1981 *RCRA Inspection Report*, used pickling liquor and sludges were sent to an off-site disposal facility. Prior disposal practices for this material – if generated – is not known.

I.4.4 Painting and Sand Blasting Wastes

Although the Compressor/Turbo Division reportedly generated these wastes, it is unclear how these wastes were disposed. As with other operations, disposal practices anticipated to have occurred include placement in the old landfill and offsite disposal.

I.4.4 Potentially Hazardous Raw Material Disposal

There were several raw materials used by the Turbo/Compressor Division that were listed by the 1981 *RCRA Inspection Report* as hazardous. These included substances such as acids, cleaners, rust preventors/inhibitors, xylene, toluene, ethanol, acetone, copper and nickel plating solutions, etching solutions, acetylene, epoxies, primers, enamels, paint strippers, thinners water soluble lubricant, degreasers, and other materials whose uses were not immediately identifiable. No information on the disposal process associated with any unused raw material was found in the sources reviewed.

Table I-4: Turbo Division: Summary of Waste Disposal* (1981-1985)

Waste Product	Disposal Method
Spent Cooling Oil and Coolant	AST, Certified Treatment Facility
Grinding Sludge	High Point Containers, Landfill**
Contaminated Metal Chips	High Point Containers
Dust from Sand Blast Collector	Landfill**
Dry-Type Paint Booth Filters	High Point Containers
Spent Solvents	Powerhouse***, Certified Treatment Facility
Caustic Degreasing Solution	Waste Oil Tank
Pickling and Rinse Solution	Certified Treatment Facility (with Waste Oil Material)
Water Spray after Pickling Rinse	Drain

Source: August 25, 1981. Craig Kauffman. Note to RCRA File (attached to Hazardous Waste Management Memos)

* It should be noted that this table is based on IR management documents, and that interviews with former employees have revealed that other disposal practices were also employed. Please refer to section I.1.

** It is unclear whether the landfill indicated in these documents was the onsite landfill or another offsite disposal facility.

*** It is not clear whether this indicates that the spent solvent were being incinerated at the Power House, or stored at the adjacent Hazardous Materials Storage Shed for offsite disposal.

I.5 Foundry Division Waste Management

Waste streams from the foundry would have been generated from pattern making and repair processes, molding practices, metal casting and finishing operations, and furnaces.

The Foundry Division used a variety of processes that created potentially hazardous wastes (e.g. foundry sand and dust, spent solvents, and spent resins). No information was identified regarding the presence or disposal of waste chemicals specific to the Foundry Division. Based on the Foundry's scope of operation, It is possible that no bulk liquid chemicals were used (with the possible exception of oil for firing various furnaces).

I.5.1 Foundry Sand Disposal

The primary waste product of the Foundry Division was spent foundry sand. The molding, core, and casting operations that were concentrated in the Foundry Division produced large quantities of waste sand and dust (Capsule Laboratories, 1981). A 1985 letter stated that the plant no longer used phenolic or furan binding, but was using an alkyd-oil system. According to several sources, foundry sand was disposed of in the old landfill (AOC-29) and was used across the site to raise grade for construction projects. By 1978, spent foundry sand was disposed of at an offsite disposal facility while the facility prepared to open a new permitted landfill. The new landfill opened in the early 1990s and

was permitted to accept building debris and foundry sand. However, foundry operations were ceased shortly thereafter and no additional foundry sand was generated.

I.5.2 Pattern and Mold Waste Disposal

Ceramic, wood, and plastic patterns and molds were all created at the IR facility at some time in its history. Wood patterns were deposited in the old landfill. By 1985 only ceramic and plastic molds were made. Used ceramic molds, plastic scraps, waste refractory, and foundry sand were a composite waste stream, and were probably disposed of together. Although the final disposal destination was not revealed in documentation reviewed, based on historical information, disposal practices likely consisted of placement in the old landfill until the late 1970s when all facility wastes were disposed of offsite.

I.5.3 Furnace Waste Disposal

The electric arc furnace produced emission control dust. Emission control dust was collected in baghouses (Capsule Laboratories, 1981) and likely disposed of in the old landfill until the late 1970s when disposal was conducted at offsite facilities..

Waste slag was also likely disposed in the old landfill along with spent foundry sand. A 1981 document indicated that at the time furnace slag was disposed of in High Point Sanitation containers, for off-site disposal.

The alumino-silicate refractory material that lined the1500 pound induction furnaces were also part of the foundry waste stream. According to a 1985 letter on foundry waste streams, during the casting process the lining sometimes came off the furnace. This waste lining, as well as lining that was removed when the furnaces were relined, was stored in the same container as waste foundry sand. As such, these liners were likely placed in the old landfill until the 1970s, when this material was diverted to offsite disposal locations.

During early operations, Cuppola furnaces operated with no controls and waste materials are anticipated to have been disposed of in the old landfill with spent foundry sand.

I.5.4 Emission Control Dust Disposal

Baghouses located in the Foundry Division collected emission control dust,. No further information was given regarding the disposal process or location of this dust in the 1981 RCRA Inspection Report; however, according to a 1985 letter, baghouse dust generated from the main shop, grinding and welding processes, which did not contain flue gas materials and were placed in separate containers. According to the 1985 RCRA Part B Questionnaire the dust was placed in the onsite landfill. Documentation indicates that dust collector waste continued to be disposed of in the plant's landfill

after the foundry sand waste was removed offsite (starting circa 1977). It is not known when this practice ended.

I.5.5 Potentially Hazardous Raw Material Disposal

There were several raw materials used by the Foundry Division that were listed by the 1981 Capsule RCRA Inspection Report as hazardous if disposed. These included substances such as acids, binders, solvents, trichloroethane, ready mixes, aerosols, and other materials whose uses were not immediately identifiable. A variety of other materials were also listed as potentially hazardous, such as tellurium, casting materials, hardeners, thinners, resins, and other materials whose uses were not immediately identifiable. Information on the disposal processes and locations regarding these chemicals was not found in documentation reviewed by ENSR.

TABLE I-5: Foundry Division: Summary of Waste Disposal* (1981-1985)

Waste Product	Disposal Method
Core and Mold Sand	Landfill (onsite and offsite)
Furnace Slag	High Point Containers
Dust from Furnace Collector	Landfill (onsite)
Dust from Blasting and Sand Reclamation Collector	Landfill (onsite)
Dust from Grinding Collector	Landfill (onsite)
Unused Materials	Stored in Building #4
Ceramic Leaching Tank Solution	Drain

Source: August 25, 1981. Craig Kauffman. Note to RCRA File (attached to Hazardous Waste Management Memos); April 23, 1985. Bruce Ferretti. RCRA Part B Submission Questionnaire for Section 3004 (u) of RCRA Amendment.

* It should be noted that this table is based on IR management documents, and that interviews with former employees have revealed that other disposal practices were also employed. Please refer to section I.1.